MATHE*dunesa*
Jurnal Ilmiah Pendidikan Matematika *Volume 8 No. 2 Tahun 2019*
ISSN :2301-9085

DEVELOPMENT OF INTERACTIVE E-BOOK IN CUBE AND CUBOID FOR 8th GRADE JUNIOR HIGH SCHOOL STUDENTS

Siska Dewi Purbasari
Mathematics Education, Faculty of Mathematics and Natural Science, Universitas Negeri Surabaya
email : siskapurbasari@mhs.unesa.ac.id, 33.siskasari@gmail.com

Siti Khabibah
Mathematics Education, Faculty of Mathematics and Natural Science, Universitas Negeri Surabaya
email : sitikhabibah@unesa.ac.id

Abstract

Indonesia developed an e-book named BSE as a learning source for students to study cube and cuboid to keep up with the trend of technological development. BSE, however, still has weakness that could be improved. The innovation could be done by combining interactive multimedia and e-book. Interactive multimedia had many features, such as video, audio, animation, etc, which could help student when learning about cube and cuboid. This study aims to know the developing proccess and produce an interactive e-book with some criteria called validity, practicality, and effectivity. Subject for this study was 6 students from 8th grade. This study was carried out using plomp model with four phase. First, initial investigation that consists of curriculum, material, and student need analysis. Second, design that consists of content, display, and instrument design. Third, realization, that consists of product development named prototype-I. Forth, test, evaluation, and revision that consists of interactive e-book validation by validator, revision, and trials. The result of this study was interactive e-book about cube and cuboid for student in 8th grade. That interactive e-book was a good media, because it was satisfy valid with score 2,94; practical with score 83,85%; and effective with score 83,33%.

Keywords: interactive e-book, interactive multimedia, cube and cuboid

INTRODUCTION

The development of learning media is very innovative these days, including the development of interactive multimedia. Interactive multimedia is an effective and efficient way to deliver material. That statement is supported by Sumarni (2013) who stated that using interactive multimedia could improve students' abilities to understand the material. One of the tools used to access interactive multimedia is computers. Computer usage in education is increasing, as shown by the use of computer in the national exam that started in 2015.

The development of science and technology turned books into digital devices called e-book. Indonesia has an e-book to support learning process called BSE (Buku Sekolah Elektronik). That e-book is one of many learning resources to learn about cube and cuboid. In Kurikulum 2013, cube and cuboid is one of the materials in mathematics for 8th grade. However, BSE does not have additional features, such as video, audio, animation, etc. From students' point of view, it looks less attractive because the e-book only presents text and images. Mutia (2017) said that students had difficulty to learn about cube and cuboid in identify the elements, found the formulas, and used the formulas. That difficulty could be solved by using computer based learning media (Mutia, 2017). So, interactive multimedia could help students to learn cube and cuboid, because interactive multimedia is a computer based media that combines elements of audio, video, text, images, and interactivity which needed by students.

An innovation should be done to develop an interactive e-book for cube and cuboid by combining e-book with interactive multimedia. Therefore the researcher is interested in developing interactive e-book cube and cuboid for 8th grade junior high school students. This study aimed to (1) describe the process of developing interactive e-book cube and cuboid for 8th grade junior high school students that is valid, practical, and effective and (2) describe the results of developing interactive e-book cube and cuboid for 8th grade junior high school students which is valid, practical and effective.

METHODS

This study used Plomp model development research. Plomp model has 5 phases, namely: initial investigation phase; design phase; realization phase; test, evaluation, and revision phase; implementation phase. However, in this research, the researcher used four phases, because this

research was conducted to obtain an interactive e-book with valid, practical, and effective criteria.

Initial investigation phase was carried out to find the basic problems to develop the interactive e-book. This phase was carried out to analyze curriculum, material, and student needs. Design phase was set out to design the content, the display of the interactive e-book, and the instruments. Realization phase was to develop the interactive e-book and instruments. Interactive e-books were developed based on the designs that had been created before. The result in this phase is a product called prototype-1. The last phase is test, evaluation, and revision phase. In this phase, the product would be evaluated by validator.

The revisions would be done based on the evaluation results from the validator. Revisions would be done untill the product got good media label with valid, practical, and effective criteria. That statement was supported by Nieveen (1999) that said the quality of the development process is viewed according 3 aspects: (1) validity, which refers to expert validation; (2) practicality, which is related to convenience and attractiveness; and (3) effectiveness, which is seen from student's learning outcomes. If the interactive e-book that has been developed fulfills all three aspects, then the interactive e-book is categorized as appropriate or good media.

According to Yamasari (2010) and Monika (2014) the validity of the media includes three types, namely: display, content, and language. Content aspects include material suitability, completeness of media components and clarity of instructions for use. Display aspects consist of harmony of design, fonts, and animation. For language aspect, it includes the standard and ease of language. In this study, the validator is a media expert lecturer and material. The interactive e-book would be valid by the validator if the average validation result is at least 2.5 (Ratumanan, 2006).

The limited trial conducted after the interactive e-book satisfied validity criteria. Limited trial was conducted for 6 students in 8th grade who have high, medium, and low abilities. Each category skill consists of 2 different genders. Students' abilities are determined based on the results of student's initial ability test. The initial ability test is done after the media are shared and the procedure is explained. After that, students learned cube and cuboid using the interactive e-book. After the process was completed, the researcher gave a quiz to find out the effectiveness of the interactive e-book. The quiz was given in the last section of the interactive e-book. The quiz was conducted to know the effectiveness of the interactive e-book. The effectiveness of learning media is related to the use of the media as a tool to achieve learning goals (Nieveen, 1999). The effectiveness of learning media can be observed from the quality of learning outcomes. The learning media is said to be effective if the media could help students achieve the learning goals. In this study, Interactive e-book would be effective if at least 75% score of student's learning outcomes are minimal equal to KKM (Arikunto, 2010).

Then, the researcher gave a questionnaire for students' responses to find out the practicality of the interactive e-book. The practicality of learning media is related to the implementation of a media in the learning process. According to Nieveen (1999), practicality considers the ease of developing interactive e-books, easy to understand, and easy to use. Practicality refers to how far user's argument about the convenience and attraction of the interactive e-book. This is supported by Widoyoko (2009) and Maryono (2008) who stated that convenience and attraction were aspects of media practicality. The practicality of this study was obtained from a field test using a questionnaire. Practical data was obtained from student response questionnaires during the trial. Interactive e-book would be practical if the student's response questionnaire stated that the interactive e-book was interesting and aesy to use with minimal percentage 75%.

RESULT

Development process of the interactive e-book was consist of four phase, they were initial investigation phase; design phase, realization phase; test, evaluation, and revision phase. First phase, there were three activities that were done in initial investigation phase, namely curriculum analysis, material analysis, and student needs analysis. Analyze the curriculum was conducted to decide the curriculum that would be used in the interactive e-book. Indonesia education curriculum uses Kurikulum 2013. Kurikulum 2013 was implemented since 2013.

Analyze the material was conducted to know the material content of cube and cuboid in Kurikulum 2013. The material content that would be developed in this interactive e-book were definition of cubes and cuboid, cube and cuboid elements, cube and cuboid nets, surface area of cubes and cuboid, volume of cubes and cuboid.

The last analysis was analysing the student needs. Students have problem in learning cube and cuboid. The problem is that they are unable to imagine 3D object, so they need a learning media that could help them to show 3D object. That problem could be solved by using computer based media. Because one of the benefits from computer based learning media is that it could show animation of 3D object. Another problem is that students only memorize the formulas about cube and cuboid and they will forget the formulas later. That problem can be solved by making students to find the formulas not just memorize them. By using an interactive e-book, the problem above can be solved in one step because, interactive e-book is computer based media. It will be able

to show animation of 3D object and help student to find the formulas by its interactiveness. Other features are video, sound, and animations on the interactive e-book.

Second phase, there were three design that would be done in design phase, they were content, display, and instrument designing. The content of the interactive e-book consists of introduction, learning objectives, initial tests, learning experiences, study materials, and final tests. The activities that were done in design display were designing the cover page, designing the e-book background as a whole, determining the type, color, and size of the fonts, and designing the buttons that would be used. The activities that were done in design the instrument were made the layout of validation sheet, initial ability test, quiz, and student response questionnaire.

Third phase, there were three activites that would be done in realization phase, they were developing instrument, display, and interactive e-book. The layout that was designed would be developed to be the instruments. The instruments in this study included validation sheets, initial ability tests, quiz, and student response questionnaires. Display that needed to be developed at this phase consisted of cover page, background, and buttons.

Figure 1. Display

For developing interactive e-book, all the components that had been made would be compiled and imported into the PageFlip Professional 3D application.

Figure 2. Content

Last phase, the interactive e-book that had been developed was submitted to the validator to obtain a valid label. The result of media validation was 2.94. Based on the validation criteria, the media gets valid result. Then, revisions were made according to the suggestions from the validator. After completing the revision, a limited trial would be conducted. Limited trials were conducted for 6 student 8th Grade with high, medium, and low abilities. Each ability consists of students of different genders. The subject was determined based on the value of the initial ability test. After the subject was selected, learning process using interactive e-book would begin. After that the students worked on the quiz. The result of the quiz to know the interactive e-book effectiveness. The result of the effectiveness is that 5 out of 6 students get scores above KKM. So, the percentage of students' completeness is 83.33%. Based on the criteria for media effectiveness, it can be stated that media is very effective to use. Lastly, students would be given a questionnaire about their interest and ease of the interactive e-book. The results of the practicality were obtained from the response questionnaire filled by the six students. The results of media practicality which were obtained were 83.85%. Based on the practicality criteria of the media, the media was interesting and easy to use. Based on the results of the validation, effectiveness, and practicality of the media, the interactive e-book that was developed was good media.

CONCLUSIONS AND SUGGESTIONS

Conclusions

Conclusions from the research that has been done are:

1. The process from this study used the Plomp model. The process of each phase of the research, namely:
   a. Initial investigation phase, that consists of curriculum analysis, material analysis, and student need analysis. The result of this phase was information about curriculum, cube and cuboid material, and student need.
   b. Design phase, that consists of the content design, the display design, and the instrument design. The result of this phase was design of interactive e-book and instrument's layout.
   c. Realization phase, at this phase an interactive e-book was developed where the product called by prototype-1.
   d. Evaluation and revision phase that consists of interactive e-book validation by validator, interactive e-book revision, and trials for the students to evaluate the effectiveness and the practicality from interactive e-book. The result of

this phase was a good interactive e-book with valid, practical, and effective criteria.

2. The results of this study is interactive e-book about cube and cuboid material for eighth grade student. The interactive e-book is an application that can be installed in PC with minimal windows 8. The features in this application are introduction, learning objectives, initial tests, learning experiences, study materials, final tests, animation, audio, video, and interactive media. The interactive e-book is a good media, because it fulfills all three aspects: valid, practical, and effective. Firstly, the interactive e-book is valid with score 2.94. Secondly, the interactive e-book is interesting and easy to use with the practicality score 83.85% which was obtained from the results of the students' response questionnaire. Next, the interactive e-book is very effective with score of 83.33% which is obtained from the results of the students' learning outcomes test.

Suggestions

The following are things that researchers can recommend when doing research,

1. For researchers who want to develop interactive e-book, it's best to use software that was suitable for the PC used. Because the application used in this study was only limited to PCs that have a minimum of Windows 8.
2. Before the interactive e-book was evaluated, check the data that was input in the interactive e-book. So, it could overcome if there were audio, videos, and animations that do not go as desired. It was because difference of PC spesification. This was based on the validator's suggestion.

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